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Via del Carroccio, 4 I 20853 Biassono (Italy)

Report number: 295103-3TRFWL

Apparatus: Video door phone with wireless module MIFARE

Applicant: URMET SPA
Via Bologna, 188 – 10154 Torino (TO) – Italy

FCC ID: FCC ID#: REA171732

Test specification:

Title 47 - Telecommunication
Chapter I - Federal Communications Commission
Subchapter A - General
Part 15 - Radio Frequency Devices
Subpart C - Intentional Radiators

– **§15.225 – Operation within the band 13.110–14.010 MHz**

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	Signature	Date
	Daniele Guarnone, Wireless/EMC Specialist	

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Report Number: 295103-3TRWL

Specification: FCC 15.225

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Section 1: Report summary

Report Number: 295103-3TRFWL

Specification: FCC 15.225

Section 1: Report summary

This report contains an assessment of apparatus against specifications based upon tests carried out on samples submitted at Nemko Canada Inc.

Test specification:

FCC Part 15 Subpart C, 15.225

Operation within the band 13.110–14.010 MHz.

Compliance status:	Complies
Exclusions:	None
Non-compliances:	None
Report release history:	Original release
Test location:	Nemko Spa Via del Carroccio, 4 I 20853 Biassono (Italy)
Registration number:	481407 (10 m Semi anechoic chamber)

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report.

This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contained in this report are within Nemko Italy's ISO/IEC 17025 accreditation.

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Section 2: Equipment under test

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Specification: FCC 15.225

Section 2: Equipment under test

2.1 Identification of equipment under test (EUT)

The following information identifies the EUT under test:

Type of equipment:	Video door phone with wireless module MIFARE
Product marketing name:	
Model number:	1717/32
Variant Model number:	1717/34
Serial number:	--
Nemko sample number:	--
FCC ID:	REA171732
Date of receipt:	2015-09-29

2.2 Accessories and support equipment

The following information identifies accessories used to exercise the EUT during testing:

none



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Section 2: Equipment under test

Report Number: 295103-3TRFWL

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Section 2: Equipment under test, continued

2.3 EUT description

Video door phone with wireless module MIFARE

2.4 Technical specifications of the EUT

Operating frequency:	13.56 MHz
Modulation type:	ASK
Occupied bandwidth:	0.435 MHz
Emission designator:	A1D
Antenna data:	--
Antenna type:	Integral
Power source	24VDC



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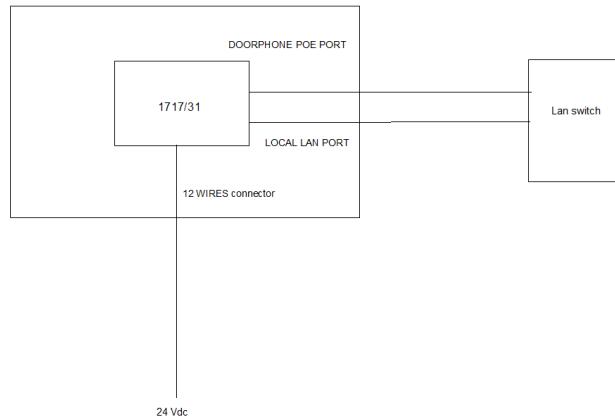
Section 2: Equipment under test

Report Number: 295103-3TRFWL

Specification: FCC 15.225

Section 2: Equipment under test, continued

2.5 EUT setup diagram



2.6 Operation of the EUT during testing

Reading the tag

2.7 Modifications incorporated in the EUT

None/Comments (Performed by: Client or Nemko)

There were no modifications performed to the EUT during this assessment.



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Section 3: Test conditions

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Section 3: Test conditions

3.1 Deviations from laboratory tests procedures

No deviations were made from laboratory test procedures.

3.2 Test conditions, power source and ambient temperatures

Normal temperature, humidity and air pressure test conditions	Temperature: 15–30 °C Relative humidity: 20–75 % Air pressure: 86–106 kPa When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.
Power supply range:	The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages $\pm 5\%$, for which the equipment was designed.



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Section 3: Test conditions

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Specification: FCC 15.225

Section 3: Test conditions, continued

3.3 Measurement uncertainty

Nemko S.p.A. measurement uncertainty has been calculated using the standard CISPR 16-4-2 "Specification for radio disturbance and immunity measuring apparatus and methods – Part 4-2: Uncertainties, statistics and limit modeling – Uncertainty in EMC measurements". All calculations have been performed to provide a confidence level of 95 % and can be found in Nemko S.p.A. document WML1002.

3.4 Test equipment

Equipment	Manufacturer	Model No.	Asset/Serial No.	Next cal.
Trilog Broadband Antenna	Schwarzbeck	VULB 9162	9162-025	2018/07
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2016/09
Antenna mast	R&S	HCM	836 529/05	NCR
Controller	R&S	HCC	836 620/7	NCR
EMI receiver 9 kHz ÷ 3 GHz	R&S	ESCI	100888	2016/09
LISN 9 kHz ÷ 30 MHz	R&S	ESH2-Z5	872 460/041	2016/11
Climatic Chamber	ESPEC	ARS 1100	4100000067	2016/12
Loop antenna	R&S	HFH2-Z2	831247/011	2017/02
EMI receiver 20 Hz ÷ 8 GHz	R&S	ESU8	100202	2016/04

Note: N/A = Not Applicable, NCR = No Cal Required, COU = CAL On Use



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Section 4: Result summary

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Specification: FCC 15.225

Section 4: Result summary

4.1 FCC Part 15 Subpart C, 15.225: Test results

The column headed 'Required' indicates whether the associated clauses were invoked for the apparatus under test. The following abbreviations are used:

N	No : not applicable / not relevant.
Y	Yes : Mandatory i.e. the apparatus shall conform to these tests.
N/T	Not Tested, mandatory but not assessed. (See report summary)

Part	Test description	Required	Result
General requirements for FCC Part 15			
§15.31(e)	Variation of power source		Pass
§15.203	Antenna requirement		Pass
§15.207(a)	Conducted limits		Pass
Specific requirements for FCC Part 15 Subpart C, 15.225			
§15.215(c)	20 dB bandwidth	Y	Pass
§15.225(a)	Field strength in the 13.553–13.567 MHz band	Y	Pass
§15.225(b)	Field strength in the 13.410–13.553 MHz and 13.567–13.710 MHz band	Y	Pass
§15.225(c)	Field strength in the 13.110–13.410 MHz and 13.710–14.010 MHz band	Y	Pass
§15.225(d)	Field strength of any emissions appearing outside of the 13.110–14.010 MHz band	Y	Pass
§15.225(e)	Frequency tolerance of the carrier signal		
§15.225(f)	Radio frequency powered tags		
Notes: None			



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Appendix A: Test results

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Appendix A: Test results

Clause 15.31(e) Variation of the power source

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85 % and 115 % of the nominal rated supply voltage. For battery-operated equipment, the equipment tests shall be performed using a new battery.

Test date: 2015-10-05

Test results: Pass

Test data

- Transmit output power was measured while supply voltage was varied (85 % to 115 % of the nominal rated supply voltage). No change in transmit output power was observed.



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Appendix A: Test results

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Specification: FCC 15.225

Clause 15.203 Antenna requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

Test date: 2015-10-05

Test results: Pass

Test data

- EUT is designed so that the end user may replace a broken antenna. (The EUT has a non-standard antenna jack or electrical connector.)
- The EUT is professionally installed.
- The EUT uses a unique antenna coupling/ non-detachable antenna to the intentional radiator.

Detailed photo of RF connector





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Appendix A: Test results

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Specification: FCC 15.225

Clause 15.207(a) Conducted limits

An intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 kHz to 30 MHz, shall not exceed the limits in the following table, as measured using a 50 μ H/50 Ω line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dB μ V)	
	Quasi-peak	Average
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

*-Decreases with the logarithm of the frequency.

Test date: 2015-10-08

Test results: Pass

Special notes

Port under test: DC port (emissions measured on typical linear AC power supply)

Preview measurements:

0.15 MHz to 30 MHz

Receiver settings:

- Peak and average detector
- 9 kHz RBW

- Spectral plots have been corrected for transducer factors; cable loss, LISN, and attenuators.
- Emissions detected within 6 dB of limit were re-measured with a quasi peak or average detector for a final measurement.

Final measurement:

0.15 MHz to 30 MHz

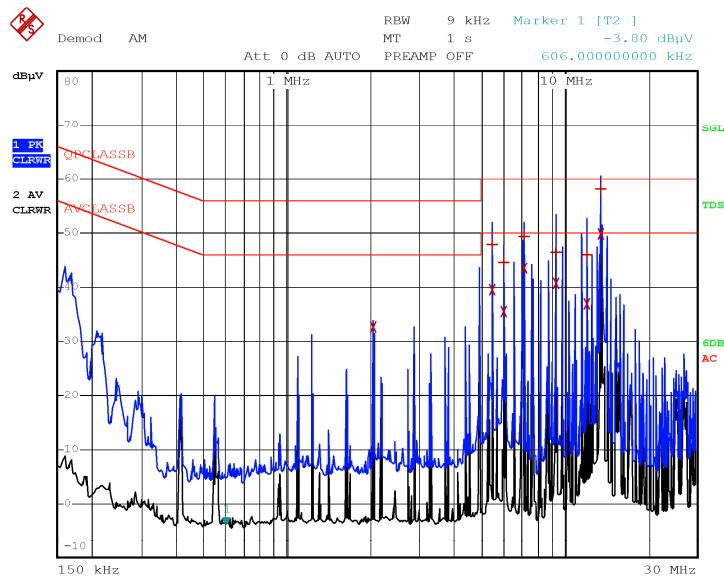
Receiver settings:

- Q-Peak and average detector
- 9 kHz RBW

Clause 15.207(a) Conducted limits, continued

Test data

Phase line



Date: 8.OCT.2015 14:47:52

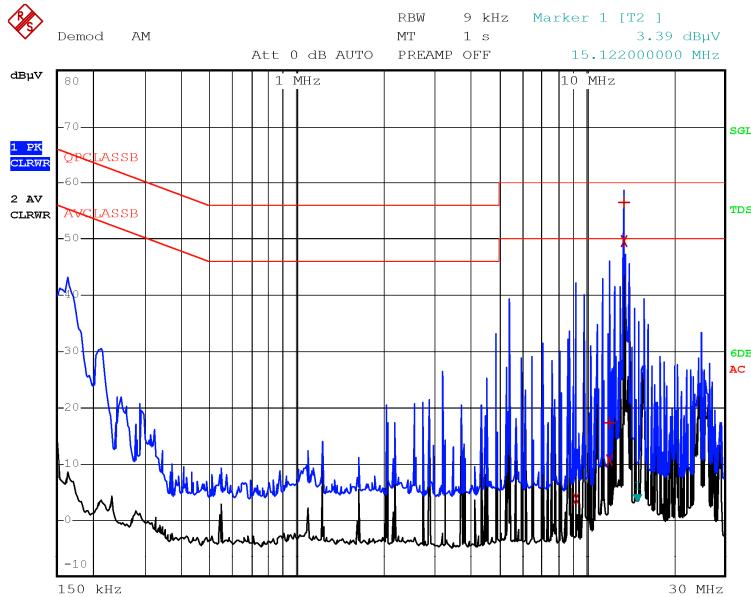
Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
2.0580	32.6	46.0	-13.4	AV
5.4860	48.0	60.0	-12.0	QP
5.4860	39.5	50.0	-10.5	AV
6.0340	44.7	60.0	-15.3	QP
6.0340	35.6	50.0	-14.4	AV
7.1340	49.3	60.0	-10.7	QP
7.1340	43.5	50.0	-6.5	AV
9.3260	46.6	60.0	-13.4	QP
9.3260	40.7	50.0	-9.3	AV
12.0700	46.0	60.0	-14.0	QP
12.0700	36.9	50.0	-13.1	AV
13.5620	58.2	60.0	-1.8	QP
13.5620	49.8	50.0	-0.2	AV

Note: Correction factor includes cable loss, LISN, and attenuator.

Clause 15.207(a) Conducted limits, continued

Test data, continued

Neutral line



Date: 8.OCT.2015 14:39:11

Frequency (MHz)	Level (dBμV)	Limit (dBμV)	Margin (dB)	Detector
9.2700	3.9	50.0	-46.1	AV
11.9980	17.3	60.0	-42.7	QP
11.9980	10.7	50.0	-39.3	AV
13.5620	56.5	60.0	-3.5	QP
13.5620	49.6	50.0	-0.4	AV



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Appendix A: Test results

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Specification: FCC 15.225

Clause 15.207(a) Conducted limits, continued

Set up photo





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Appendix A: Test results

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Specification: FCC 15.225

Clause 15.215(c) 20 dB bandwidth

Intentional radiators operating under the alternative provisions to the general emission limits, as contained in §§15.217 through 15.257 and in Subpart E of this part, must be designed to ensure that the 20 dB bandwidth of the emission, or whatever bandwidth may otherwise be specified in the specific rule section under which the equipment operates, is contained within the frequency band designated in the rule section under which the equipment is operated. The requirement to contain the designated bandwidth of the emission within the specified frequency band includes the effects from frequency sweeping, frequency hopping and other modulation techniques that may be employed as well as the frequency stability of the transmitter over expected variations in temperature and supply voltage. If a frequency stability is not specified in the regulations, it is recommended that the fundamental emission be kept within at least the central 80 % of the permitted band in order to minimize the possibility of out-of-band operation.

Test date: 2015-10-05

Test results: Pass

Special notes

None



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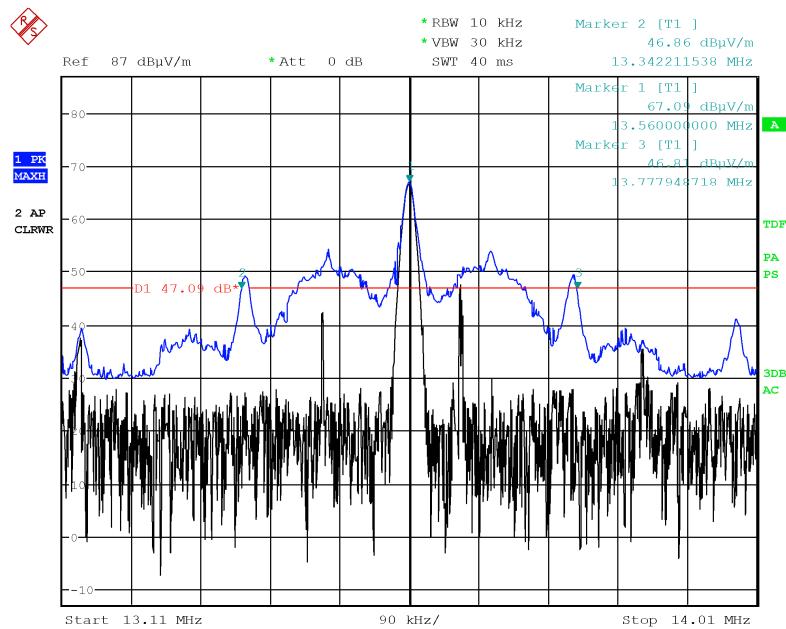
Appendix A: Test results

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Specification: FCC 15.225

Clause 15.215(c) 20 dB bandwidth, continued

Test data



Date: 5.OCT.2015 19:53:50

Lower frequency cross, MHz	Limit, MHz	Margin, MHz
13.342	13.110	0.232
Upper frequency cross, MHz	Limit, MHz	Margin, MHz
13.778	14.010	0.786



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Appendix A: Test results

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Specification: FCC 15.225

Clause 15.225(a) Field Strength in the 13.553–13.567 MHz band

The field strength of any emissions within the band 13.553–13.567 MHz shall not exceed 15,848 μ V/m (84 dB μ V/m) at 30 meters.

Clause 15.225(b) Field Strength in the 13.410–13.553 MHz and 13.567–13.710 MHz bands

Within the bands 13.410–13.553 MHz and 13.567–13.710 MHz, the field strength of any emissions shall not exceed 334 μ V/m (50.5 dB μ V/m) at 30 meters.

Clause 15.225(c) Field Strength in the 13.110–13.410 MHz and 13.710–14.010 MHz bands

Within the bands 13.110–13.410 MHz and 13.710–14.010 MHz the field strength of any emissions shall not exceed 106 μ V/m (40.5 dB μ V/m) at 30 meters.

Test date: 2015-10-05

Test results: Pass

Special notes

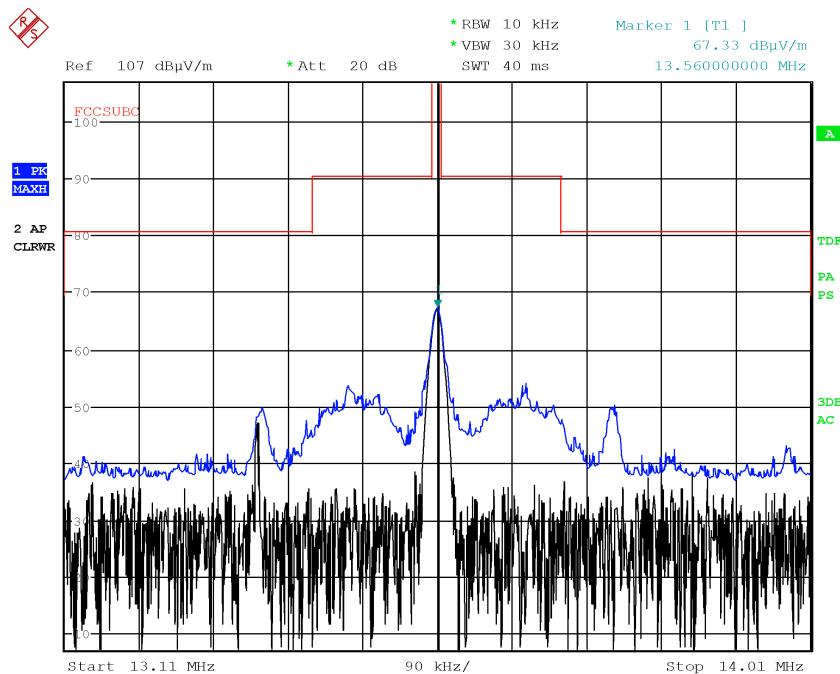
The measurements were performed using peak detector with 10 kHz RBW at the distance of 3 m. Distance correction* was applied to the measurement result in order to comply with 30 m limits. The EUT was measured on three orthogonal axis and was rotated 360°

* - 30 m to 3 m correction factor calculation (for 13 MHz band):

$$40 \times \log (30 \text{ m}/3 \text{ m}) = 40 \text{ dB}$$

Clause 15.225(a,b,c)

Test data



Date: 5.OCT.2015 20:18:57

Frequency MHz	Field strength at 3 m, dB μ V/m	Calculated field strength at 30 m, dB μ V/m	Limit, dB μ V/m	Margin, dB
13.560	67.3	27.3	84.0	56.7

Note: Calculated field strength at 30 m = Measured field strength at 3 m - 40 dB



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Appendix A: Test results

Report Number: 295103-3TRFWL

Specification: FCC 15.225

Clause 15.225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band

The field strength of any emissions appearing outside of the 13.110–14.010 MHz band shall not exceed the general radiated emission limits in §15.209

The field strength of emissions appearing within restricted bands (as specified in §15.205) shall not exceed the limits from §15.209:

Frequency (MHz)	Field strength		Measurement distance (m)
	(μ V/m)	(dB μ V/m)	
0.009–0.490	2400/F	67.6–20log(F)	300
0.490–1.705	24000/F	87.6–20log(F)	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes:

- F = fundamental frequency in kHz
- In the emission table above, the tighter limit applies at the band edges.
- For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Test date: 2015-10-05

Test results: Pass



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Appendix A: Test results

Report Number: 295103-3TRFWL

Specification: FCC 15.225

Clause 15. 225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band, continued

Special notes

- The spectrum was searched from 9 kHz to the 10th harmonic (2 GHz)
- The EUT was measured on three orthogonal axis.
- All measurements were performed at a distance of 3 m.
- All measurements were performed:
 - below 30 MHz: using a quasi-peak detector with 9 kHz/30 kHz RBW/VBW,
 - within 30–1000 MHz range: using a quasi-peak detector with 120 kHz/300 kHz RBW/VBW,
 - above 1 GHz: using peak detector with 1 MHz/3 MHz RBW/VBW for peak results
 - or using average detector with 1 MHz/3 MHz RBW/VBW for average results
- Only the worst data presented in the test report.

§ 15.205 Restricted bands of operation.

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			



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Appendix A: Test results

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Clause 15. 225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band,
continued

Test data

Duty cycle/average factor calculations

§15.35(c) When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Duty cycle/average factor calculations:

$$\text{Duty cycle/ average factor} = 20 \times \log_{10} \left(\frac{T_x_{100\text{ms}}}{100\text{ms}} \right)$$

N/A



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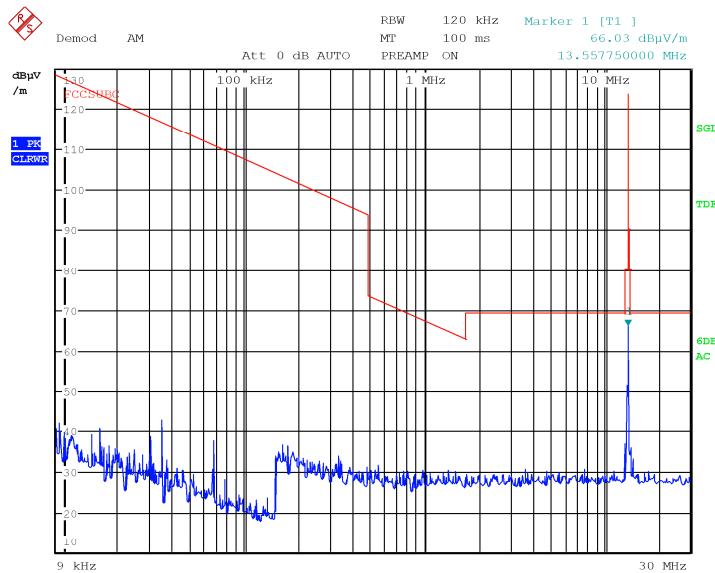
Appendix A: Test results

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Clause 15. 225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band, continued

Test data, continued



Date: 5.OCT.2015 20:12:57

Tabular data

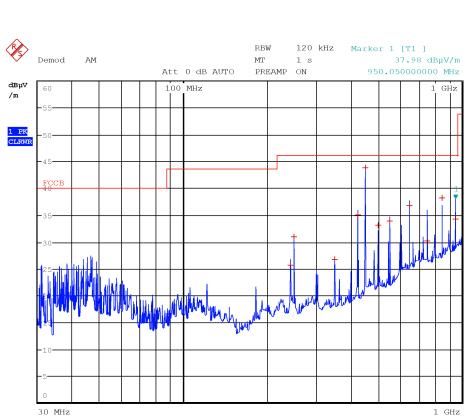
Freq. (MHz)	Pol. V/H	Peak field strength (dBµV/m)	Correction (dB)	Peak limit (dBµV/m)	Peak margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBµV/m)	Avg limit (dBµV/m)	Avg margin (dB)

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.

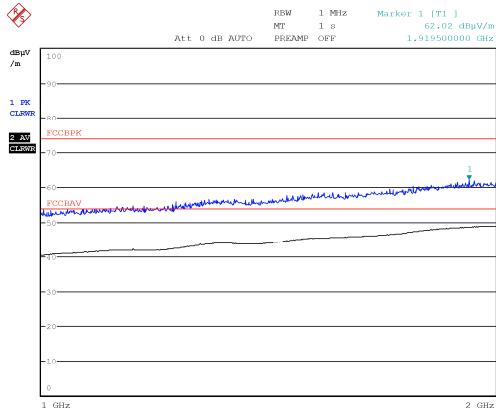
Clause 15. 225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band, continued

Test data, continued

Vertical polarization



Date: 6.OCT.2015 15:44:36



Date: 6.OCT.2015 15:32:01

Tabular data

Freq. (MHz)	Pol. V/H	Quasi Peak field strength (dBµV/m)	Correction (dB)	Quasi Peak limit (dBµV/m)	Quasi Peak margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBµV/m)	Avg limit (dBµV/m)	Avg margin (dB)
242.4500	V	25.6	14.4	46.0	-20.4	--	--	--	--
250.0250	V	31.1	14.6	46.0	-14.9	--	--	--	--
350.0250	V	26.9	17.0	46.0	-19.1	--	--	--	--
424.3000	V	35.2	18.3	46.0	-10.9	--	--	--	--
450.0250	V	43.8	18.7	46.0	-2.3	--	--	--	--
500.0250	V	33.2	19.7	46.0	-12.8	--	--	--	--
550.0250	V	34.0	20.6	46.0	-12.1	--	--	--	--
650.0250	V	36.9	22.3	46.0	-9.1	--	--	--	--
750.0250	V	30.3	23.9	46.0	-15.7	--	--	--	--
850.0500	V	38.3	25.4	46.0	-7.7	--	--	--	--
950.0500	V	34.3	26.5	46.0	-11.7	--	--	--	--

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.



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Appendix A: Test results

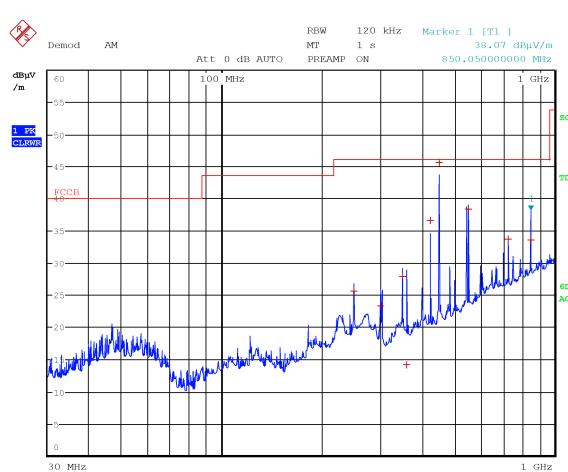
Report Number: 295103-3TRFWL

Specification: FCC 15.225

Clause 15. 225(d) Field Strength of any emissions appearing outside of the 13.110–14.010 MHz band, continued

Test data, continued

Horizontal polarization



Date: 6.OCT.2015 15:24:53

Date: 6.OCT.2015 15:34:33

Tabular data

Freq. (MHz)	Pol. V/H	Quasi Peak field strength (dBμV/m)	Correction (dB)	Quasi Peak limit (dBμV/m)	Quasi Peak margin (dB)	Duty cycle corr. (dB)	Avg field strength (dBμV/m)	Avg limit (dBμV/m)	Avg margin (dB)
250.0000	H	25.5	14.6	46.0	-20.5	--	--	--	--
300.0250	H	23.3	15.7	46.0	-22.8	--	--	--	--
350.0250	H	27.9	17.0	46.0	-18.2	--	--	--	--
359.8250	H	14.2	17.2	46.0	-31.9	--	--	--	--
424.3250	H	36.6	18.3	46.0	-9.4	--	--	--	--
450.0250	H	45.6	18.7	46.0	-0.4	--	--	--	--
550.0250	H	38.3	20.6	46.0	-7.7	--	--	--	--
727.3750	H	33.7	23.7	46.0	-12.3	--	--	--	--
850.0500	H	33.6	25.4	46.0	-12.5	--	--	--	--

Note: Correction factor includes antenna, cable loss, amplifier, and attenuators.



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Appendix A: Test results

Report Number: 295103-3TRFWL

Specification: FCC 15.225

Clause 15. 225(e) Frequency tolerance of the carrier signal

The frequency tolerance of the carrier signal shall be maintained within $\pm 0.01\%$ of the operating frequency over a temperature variation of $-20\text{ }^{\circ}\text{C}$ to $+50\text{ }^{\circ}\text{C}$ at normal supply voltage, and for a variation in the primary supply voltage from 85 % to 115 % of the rated supply voltage at a temperature of $20\text{ }^{\circ}\text{C}$. For battery-operated equipment, the equipment tests shall be performed using a new battery.

Test date: 2015-10-05

Test results: Pass

Special notes

- The test was performed using peak detector of the spectrum analyzer with RBW no narrower than 1 % of the emission bandwidth.



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Appendix A: Test results

Report Number: 295103-3TRFWL

Specification: FCC 15.225

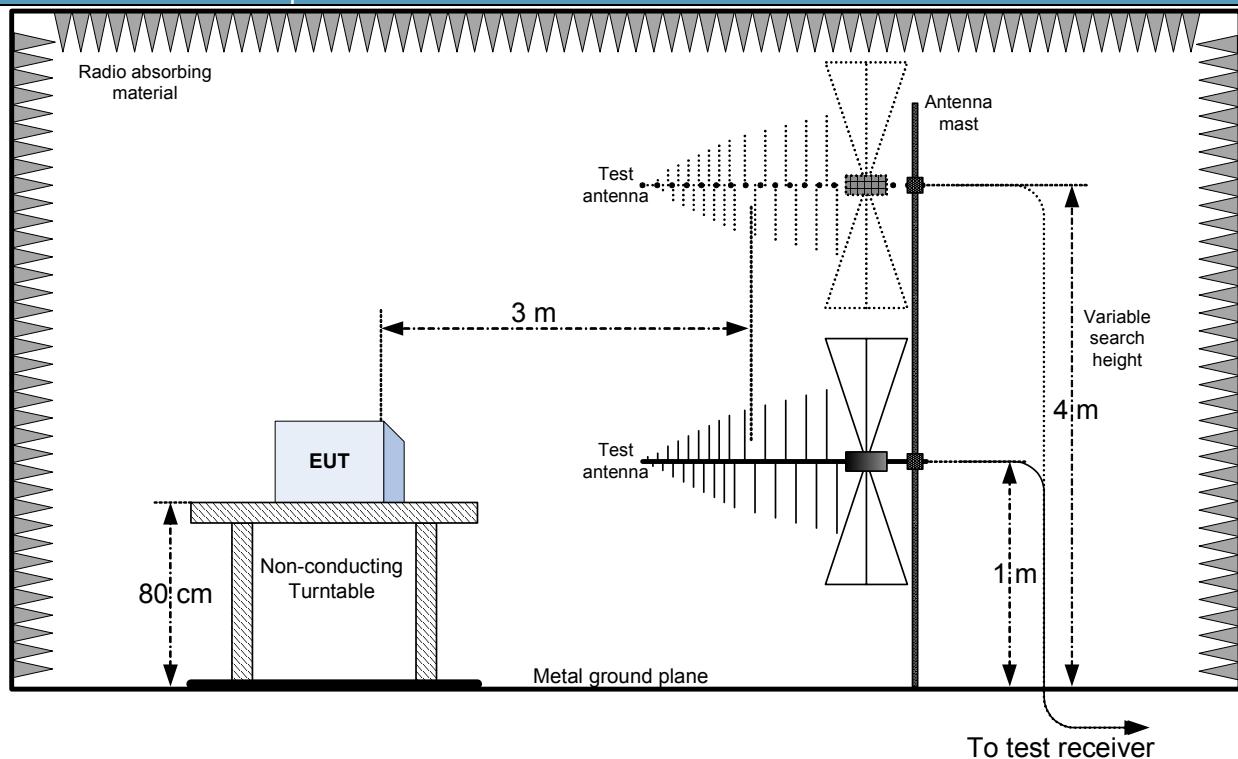
Clause 15.231(c) Emission bandwidth, continued

Test data

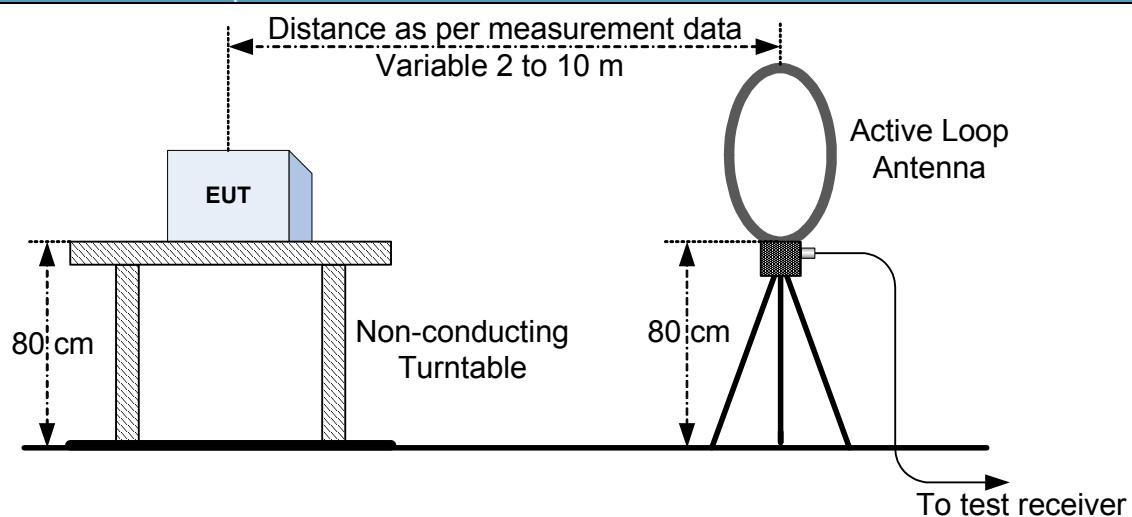
Conditions	Frequency (MHz)	Frequency error (MHz)	Frequency error (%)	Limit (%)	Margin (%)
+50 °C, Nominal power	13.56004208	0.00004208	0.000310324	±0.01	0.0096897
+40 °C, Nominal power	13.56006713	0.00006713	0.000495059	±0.01	0.0095049
+30 °C, Nominal power	13.56006713	0.00006713	0.000495059	±0.01	0.0095049
+20 °C, +10 % power	13.56000000	0.00000000	0	±0.01	0.01
+20 °C, Nominal power	13.56000000	Reference	Reference	reference	Reference
+20 °C, -10 % power	13.56000000	0.00000000	0	±0.01	0.01
+10 °C, Nominal power	13.56011723	0.00011723	0.000864528	±0.01	0.0091355
0 °C, Nominal power	13.56009218	0.00009218	0.000679794	±0.01	0.0093202
-10 °C, Nominal power	13.56009218	0.00009218	0.000679794	±0.01	0.0093202
-20 °C, Nominal power	13.56009218	0.00009218	0.000679794	±0.01	0.0093202

Appendix B: Block diagrams of test set-ups

Radiated emissions set-up above 30 MHz

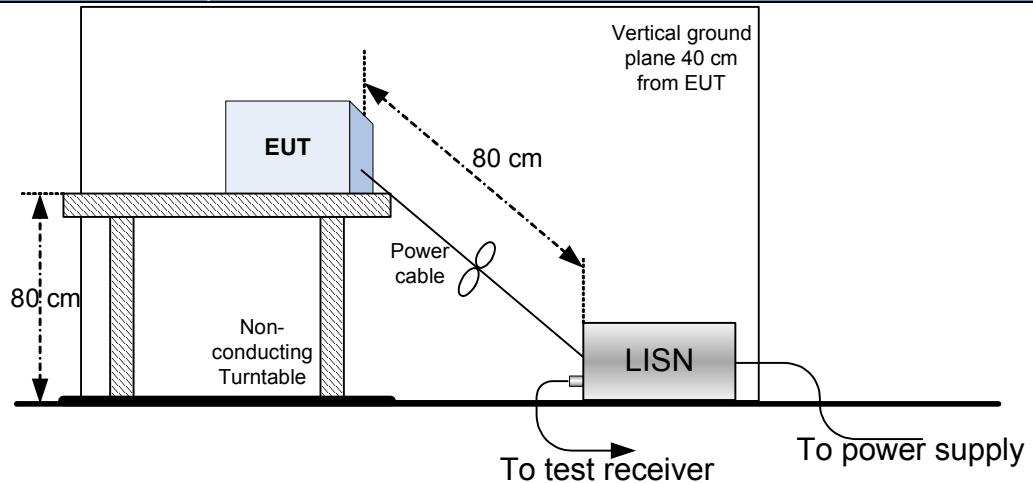


Radiated emissions set-up below 30 MHz



Block diagram, continued

Conducted emissions set-up



Frequency stability set-up

